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UNITED STATES DEPARTMENT OF AGRICULTURE

BULLETIN No. 761

Contribution from the Bureau of Animal Industry
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Washington, D. C. ▼ April 7, 1919

A COMPARISON OF CONCENTRATES FOR FATTENING STEERS IN THE SOUTH.

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I. The Comparative Value of Cottonseed Meal, Cold-Pressed Cottonseed Cake, and a Mixture of Cottonseed Meal and Corn for Fattening Steers.

II. A Comparison of Cottonseed Meal, Cottonseed Meal and Broken-Ear Corn, and Cottonseed Meal and Shelled Corn for Fattening Steers.

I. THE COMPARATIVE VALUE OF COTTONSEED MEAL, COLD-PRESSED COTTONSEED CAKE, AND A MIXTURE OF COTTONSEED MEAL AND CORN FOR FATTENING STEERS.

INTRODUCTION.

During recent years there has been much interest manifested in the manufacture of cottonseed oil from cotton seed without cooking it. The oil is extracted by severe pressure without hulling the seed, thus securing a better quality of oil and leaving a residue called cold-pressed cake, which is made up of the entire seed less the oil. With the increased output of cold-pressed cottonseed cake has arisen a demand for definite information concerning its feeding value.

Several years ago a cooperative experiment was conducted by the Bureau of Animal Industry and the Alabama experiment station testing the value of cold-pressed cottonseed cake for fattening steers on grass.[2] Now, however, most of the up-to-date farmers of the South who fatten beef cattle for the market have silos and use silage for the roughage in fattening the stock. No work had been done by the bureau to test the feeding value of cold-pressed cake when

[1] Acknowledgment is due G. A. Scott and S. W. Greene, of the Animal Husbandry Division, United States Department of Agriculture, for assistance in compiling this bulletin.

[2] See Bureau of Animal Industry Bulletin 131.

fed with silage during the winter months. To get information on this subject the experiment hereinafter described was planned and executed.

OBJECT AND PLAN OF WORK.

The objects of this experiment were to make a comparison between the feeding values of cottonseed meal and cold-pressed cottonseed cake, when each was fed to steers with a roughage ration of corn silage, and to study the effects of the addition of corn-and-cob meal to a ration of cottonseed meal and corn silage.

The steers used in this work were bought during the fall months after having been on pasture during the summer without other feed. They were placed in the cotton and cornstalk fields until the feeding was begun and were given a small allowance of cold-pressed cottonseed cake. Nearly all the 75 steers used in the test were horned when purchased. They were dehorned two weeks prior to the beginning of the experiment.

Individual weights of the steers were obtained on November 30 and December 1. After weighing on the second day the steers were divided into three lots of 25 each and started on feed. The division was made so as to have the three lots as nearly equal in weight and quality as possible.

CATTLE USED.

The steers used in the test were grade Shorthorns, Herefords, Aberdeen-Angus, and Red Polls. Their breeding was from one-half to seven-eighths pure bred. They were all raised in Madison County, Miss., and were somewhat better than the average of steers found in the State. They had been run on good grass pastures during the previous summer, and averaged 860 pounds the day they were placed in the feed lots. After they were brought to the farm they were given a small allowance of cottonseed cake and most of them were in fair condition at the beginning of the experiment. At that time the steers were all about three years of age.

CHARACTER AND PRICES OF FEED.

The cottonseed meal used in the experiment was of very good quality; the analysis showed a protein content of about 40 per cent. The cold-pressed cottonseed cake likewise was of good quality and showed a protein content of about 27.5 per cent.

The silage used was mixed; about one-half of it was made of corn, and the other half of corn and sorghum. Some of the corn used for silage would have averaged about 35 bushels an acre in production of grain. Some of it, however, was rather poor, but the silage on the whole was considered excellent by the feeders.

During the second and third 28-day periods a small amount of cowpea hay was fed to each of the three lots. During this time the

steers were given what silage they would eat and as much hay as they would consume in addition. The hay was fed in racks and less than 3½ pounds was eaten by each steer daily. It was of fair quality and contained a considerable quantity of peas.

The various feeds used were charged as follows:

Cottonseed meal	per ton..	$22.50
Cold-pressed cottonseed cake	do....	16.50
Corn	per bushel..	.70
Cowpea hay	per ton..	10.00
Silage	do....	3.00

METHOD OF FEEDING AND HANDLING CATTLE.

The steers were divided into three similar lots, 25 in each, on December 1. They were weighed individually on this and the day previous and the average of the two weights was used as the initial weight. At the end of the experiment they were again weighed individually, and in the meantime they were weighed by lots at the end of each 28-day period. Each steer was provided with a numbered metal tag, which was placed on a strap and attached around the neck for identification.

Each lot of steers had the run of a shed, which was about 24 by 30 feet in size and opened on a yard about 30 by 150 feet. All lots and sheds were kept well bedded at all times. Inferior hay, oat straw, and broom sedge were used for this purpose. The yards never became boggy, but at times were somewhat sloppy.

Stationary troughs under the sheds were used for feeding. The cowpea hay that was used during the last two months was fed in racks with a trough underneath. These racks were in the yards. The steers were fed at 7 in the morning and at 5 in the afternoon. All lots were given as much silage as they would clean up. The cowpea hay was fed once each day. Salt was given the steers in their feed troughs and over their feed once each week. Fresh water from a deep well was furnished in galvanized-iron troughs placed in the feed lots. Feed which was not cleaned up was weighed back as often as necessary, and credit for same was given the steers. The feeding period lasted 123 days.

AVERAGE DAILY RATIONS.

The amounts of silage and hay consumed by Lots 1 and 3 were practically the same; that consumed by Lot 2 was considerably less. This same condition has been found in other experiments and seems to be due principally to a considerable quantity of hulls contained in the cold-pressed cake, and as the latter can not be as thoroughly mixed with the silage as cottonseed meal, the silage may be slightly less appetizing than when cottonseed meal is fed with it. Lot 1, in addition to the roughage mentioned, received cottonseed meal; Lot 2, cold-pressed cottonseed cake; and Lot 3 a mixture of cottonseed

meal and corn-and-cob meal. The ratio used in mixing the two feeds was two parts by weight of cottonseed meal and one part corn-and-cob meal.

TABLE 1.—*Average daily rations by 28-day periods.*

Lot No.	Number of steers.	Ration.	First period.	Second period.	Third period.	Fourth period.	Fifth period (11 days).	Entire period (123 days).
			Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1	25	Cottonseed meal	5.0	6.8	7.04	7.3	7.4	6.62
		Silage	39.4	41.2	37.0	41.9	41.8	40.2
		Cowpea hay	.....	3.4	2.7	.....	.....	1.46
2	25	Cold-pressed cottonseed cake	8.6	10.3	10.6	10.7	11.0	10.0
		Silage	32.2	32.5	27.6	31.2	31.5	30.96
		Cowpea hay	.....	3.5	3.1	.....	.....	1.48
3	25	Cottonseed meal	3.7	5.1	5.3	5.9	6.0	5.1
		Corn-and-cob meal	1.8	2.5	2.6	3.0	3.0	2.55
		Silage	39.8	40.7	37.4	41.8	37.0	39.54
		Cowpea hay	.....	3.5	3.3	.....	.....	1.55

Lot 1 was started on a ration of 2 pounds of cottonseed meal. This was gradually increased until at the end of the first 28-day period they were receiving 6 pounds. The amount of meal received by each steer in this lot at the end of each period thereafter was, second period, 6 pounds; third period, 7 pounds; fourth period, 7.3 pounds. During the last week of the experiment they were receiving 7.4 pounds.

Lot 2 was started on a ration of 3.4 pounds of cold-pressed cake, which was gradually increased to 10 pounds at the end of the first month. They were kept on this amount until near the end of the fourth period, when the cake was increased to 11 pounds.

Lot 3 was started on a ration of 1.44 pounds of cottonseed meal and 0.72 pound of corn-and-cob meal. This was increased to about 4 pounds of cottonseed meal and 2 pounds of corn-and-cob meal at the end of the first 28-day period. During the second, third, and fourth periods they received an average of about 5½ pounds of cottonseed meal and 2¾ pounds of corn-and-cob meal. At the end of the experiment they were receiving 6 pounds of cottonseed meal and 3 pounds of corn-and-cob meal.

WEIGHTS AND GAINS.

The following table shows the initial and final weights and the total and average gains for each of the lots.

TABLE 2.—*Weights and gains (Dec. 1, 1914, to Apr. 3, 1915—123 days).*

Lot No.	Ration.	Average initial weight per steer.	Average final weight per steer.	Average total gain per steer.	Average daily gain per steer.
		Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
1	Cottonseed meal, silage, and cowpea hay	863	1,114	251	2.04
2	Cold-pressed cake, silage, and cowpea hay	860	1,108	248	2.01
3	Two-thirds cottonseed meal, one-third corn-and-cob meal, silage, and cowpea hay	865	1,117	252	2.05

There was very little difference in the average daily gains per steer. These gains are very satisfactory for a feeding period of 123 days with steers such as those used.

QUANTITY AND COST OF FEED REQUIRED TO MAKE 100 POUNDS OF GAIN.

Table 3 shows the amount and costs of feed required to make 100 pounds of gain.

TABLE 3.—*Quantity and cost of feed required to make 100 pounds of gain—December 1, 1914, to April 3, 1915, 123 days.*

Lot No.	Ration.	Quantity of feed to make 100 pounds of gain.	Cost of 100 pounds of gain.
		Pounds.	
1	Cottonseed meal	325	$6.96
	Silage	1,971	
	Cowpea hay	71	
2	Cold-pressed cake	502	6.80
	Silage	1,535	
	Cowpea hay	73	
3	⅔ cottonseed meal	249	7.82
	⅓ corn-and-cob meal	125	
	Silage	1,931	
	Cowpea hay	75	

Lot 1 consumed 325 pounds of cottonseed meal for each 100 pounds of gain made. Lot 2 consumed 502 pounds of cold-pressed cottonseed cake per 100 pounds gain. Lot 3 consumed 249 pounds of cottonseed meal and 125 pounds of corn-and-cob meal for 100 pounds of gain.

Lot 2 consumed much less silage per hundred pounds of gain than either of the other two lots. Lots 1, 2, and 3 consumed 1,971 pounds, 1,535 pounds, and 1,931 pounds, respectively, for each 100 pounds of gain.

Lot 2, which received cold-pressed cake, made the cheapest gains, each 100 pounds of gain costing $6.80. The gains made by Lot 3 were the most expensive, costing $7.82 per 100 pounds. The gains on Lot 1 were made at a cost of $6.96 per 100 pounds.

The cost of gains made by the steers of all lots was very satisfactory and was much smaller than usually obtained with steers fed in the ordinary manner.

FINANCIAL STATEMENT.

The steers of each lot were charged in the experiment at $5.50 per 100 pounds, which was the actual average purchase price. They were marketed at St. Louis, and sold for $7.35 per hundredweight.

The steers were driven about 3 miles from the feeding station to the railroad at Canton, Miss. They were loaded at Canton on

April 5, and arrived at the National Stock Yards on April 7, after being in transit 47 hours.

The following statement shows the financial results for each of the three lots:

Financial statement.

Lot 1, cottonseed meal, silage, and cowpea hay:	
To 25 steers, 21,580 pounds, at $5.50 per hundredweight	$1,186.90
To 20,368 pounds cottonseed meal at $22.50 per ton	229.14
To 123,668 pounds silage at $3 per ton	185.50
To 4,499 pounds cowpea hay at $10 per ton	22.49
To freight on car of 25 steers	89.60
To commission, yardage, feed, insurance, etc	26.85
Total expenditure	1,740.48
By sale of 25 steers, 25,590 pounds, at $7.35 per hundredweight	1,880.86
Total profit	136.38
Average profit per steer	5.45
Lot 2, cold-pressed cottonseed cake, silage, and cowpea hay:	
To 25 steers, 21,507 pounds, at $5.50 per hundredweight	1,187.88
To 31,183 pounds cold-pressed cake at $16.50 per ton	257.25
To 95,235 pounds silage at $3 per ton	152.85
To 4,570 pounds cowpea hay, at $10 per ton	22.85
To freight on car of 25 steers	89.60
To commission, yardage, feed, insurance, etc	26.85
Total expenditure	1,737.28
By sale of 25 steers, 25,510 pounds, at $7.35 per hundredweight	1,874.98
Total profit	137.70
Average profit per steer	5.50
Lot 3, ⅔ cottonseed meal, ⅓ corn-and-cob meal, silage, and cowpea hay:	
To 25 steers, 21,646 pounds, at $5.50 per hundredweight	$1,190.53
To 15,709 pounds cottonseed meal at $22.50 per ton	176.72
To 7,854 pounds corn-and-cob meal, at 70 cents per bushel	78.54
To 121,599 pounds silage at $3 per ton	182.40
To 4,778 pounds cowpea hay, at $10 per ton	23.89
To freight on car of 25 steers	89.60
To commission, yardage, feed, insurance, etc	26.85
Total expenditure	1,768.50
By sale of 25 steers, 25,620 pounds, at $7.35 per hundredweight	1,883.07
Total profit	114.57
Average profit per steer	4.58

The steers of Lots 1 and 2 made practically the same average profit per head, $5.45 and $5.50 per head, respectively. Lot 3, which was fed cottonseed meal and corn-and-cob meal, made a profit per steer of $4.58, being nearly a dollar per head less than Lots 1 and 2.

The steers of Lot 3 made slightly greater daily gains than either of the other two lots, but the cost per 100 pounds of gain was about

$1 greater, which reduced the profit per steer. The financial outcome of the feeding test was satisfactory, as the farm-grown feeds were marketed by means of the steers at a good price, a large amount of manure was produced for the farm, and in addition an average cash profit of more than $5 per steer was realized.

SLAUGHTER DATA.

The following table shows the shipping and slaughter data for each of the three lots:

TABLE 4.—*Slaughter data.*

Lot No.	Ration.	Average farm weight per steer.	Average market weight per steer.	Average shrinkage in transit.	Average weight of carcass.	Per cent dressed.	
						By farm weights.	By market weights.
		Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Per cent.*	*Per cent.*
1	Cottonseed meal, silage, and cowpea hay	1,092	1,024	68	608	55.67	59.37
2	Cold-pressed cake, silage, and cowpea hay	1,092	1,020	72	603	55.22	59.12
3	⅔ cottonseed meal, ⅓ corn-and-cob meal, silage, and cowpea hay	1,101	1,029	72	600	54.40	58.79

The shrinkage of the steers of all lots was very uniform and was considered about normal for that distance and time in transit. The dressing percentages were exceedingly satisfactory and show clearly that the steers of all lots were well finished. The carcasses were very desirable, showing a good covering of fat and a nice marbling of the meat.

SUMMARY OF THE EXPERIMENT.

1. The object of this experiment was to make a comparison of the feeding value of cottonseed meal, cold-pressed cottonseed cake, and a combination of cottonseed meal and corn-and-cob meal for fattening steers. As this was a study of the feeding value of various concentrates, the same kinds of roughage were fed to all three lots.

2. The 75 steers used were grade steers of medium-to-good quality, raised in Mississippi, 2 to 3 years of age, and averaging 860 pounds at the beginning of the experiment.

3. Each lot contained 25 head of steers evenly divided. When on full feed each steer was eating the following ration:

Lot 1.	Cottonseed meal	7.4 pounds.
	Corn silage	41.8 pounds.
Lot 2.	Cold-pressed cottonseed cake	11.0 pounds.
	Corn silage	31.5 pounds.
Lot 3.	Cottonseed meal	6.0 pounds.
	Corn-and-cob meal	3.0 pounds.
	Corn silage	37.0 pounds.

The steers of Lot 2, which received cold-pressed cottonseed cake, consumed much less silage per day than the other steers, because of the large amount of dry matter in the grain ration.

4. The average daily gain for each steer of Lots 1, 2, and 3, was 2.04, 2.01, and 2.05 pounds, respectively, or practically the same for each lot. The greatest variation in the total gain was 4 pounds per head for a feeding period of 123 days.

5. The cost of 100 pounds of gain for Lots 1 and 2 was very uniform, being $6.96 and $6.80. The cost for Lot 3 was $7.82.

6. After paying for all feeds at market prices each steer of the three lots made a net profit of $5.45, $5.50, and $4.58 per head, respectively.

7. Cold-pressed cottonseed cake at $16.50 per ton is as economical as cottonseed meal at $22.50 per ton, or 3 pounds of cottonseed meal proved to be equal in feeding value to 4 pounds of cold-pressed cottonseed cake; as the price of these feeds advance the same proportion should be maintained. The cottonseed meal analyzed 40.4 per cent protein and the cold-pressed cottonseed cake 27.6 per cent protein.

8. The cold-pressed cake was relished by the steers and all of them ate it readily from the first.

9. It did not pay to feed a one-third ration of corn-and-cob meal with the cottonseed meal.

10. There was no difference in the finish of the three lots and each sold for the same price, viz, $7.35 per hundred pounds.

11. The shrinkage in transit to the St. Louis market was heavier than for the steers shipped from Abbott, Miss. The steers shrank 68, 72, and 72 pounds per head, respectively, for Lots 1, 2, and 3.

12. By market weights the steers dressed out as follows: Lot 1, 59.4 per cent; Lot 2, 59.1 per cent; and Lot 3, 58.8 per cent; which indicates a uniformly high finish.

II. A COMPARISON OF COTTONSEED MEAL; COTTONSEED MEAL AND BROKEN-EAR CORN; AND COTTONSEED MEAL AND SHELLED CORN FOR FATTENING STEERS.

INTRODUCTION.

Since the boll weevil has done such damage in Mississippi the farmers have been turning very strongly to raising more live stock and more feeds for stock, such as corn and various kinds of hay. This has resulted in a greater interest in cattle feeding and a greatly increased corn crop. In many parts of the prairie and brown-loam section of Mississippi there has been quite a large amount of corn and hay produce, which has been very hard to dispose of satisfactorily because of poor roads, long distances from shipping points, and lack of knowledge regarding the marketing of such products. Under these conditions any definite information regarding the feeding of corn to beef cattle to be fattened for the market is of prime importance. The farmers and plantation owners desire to know whether it is possible to market the corn at a good price through the cattle.

To get definite information on this subject the Bureau of Animal Industry, cooperating with the Mississippi experiment station, conducted the feeding experiment described herein, using three carloads of grade Mississippi steers for the experiment.

OBJECT AND PLAN OF WORK.

The object of this experiment was to study the relative feeding value of cottonseed meal when fed alone, when supplemented with shelled corn, and when supplemented with broken-ear corn, as the concentrated part of the ration for fattening steers for the market.

The steers arrived on the farm during late October and early November. From this time until November 24 they were run in good cornstalk pasture. The experiment involved no preliminary feeding period. About one-fourth of the steers had to be dehorned, which was done two weeks previously to the date on which the experiment began. On November 23 the steers were brought to the feeding pens and 75 of the best animals were selected from a total of 127 and divided into three lots of 25 each. The different lots were practically equal in size and quality. The general plan of the feeding work was the same as that outlined in previous experiments. Mr. N. F. Hanson, under the direction of Mr. S. S. Jerdan, did the feeding and kept complete records of the work throughout the experiment.

CATTLE USED.

The steers used in the experiment were mostly grade Shorthorns, with a few Angus, Red Polls, and Herefords. The cattle were all natives, being raised in the county where fed, but as a whole were much better than the average of steers in Mississippi. They ranged in age from 2 to 3½ years. All were raised in the neighborhood of Abbott, Miss., and were free from ticks.

CHARACTER AND PRICES OF FEEDS USED.

The cottonseed meal used in the experiment contained from 39 to 41 per cent protein; the corn used was clean and sound. Most of the corn silage was very good; it kept well and showed considerable grain. The oat straw was bright and the steers ate it with relish. The following prices were paid for feeds: Cottonseed meal, $27 per ton; corn, 70 cents per bushel. The corn silage and oat straw were valued at $3 and $5 per ton, respectively. The cottonseed meal was purchased early in the fall and was then cheaper than it was later in the year. While corn could be bought on neighboring farms at about 50 cents per bushel early in the fall, it is charged at 70 cents, which was about the average market price in that section for the winter of 1915–16.

METHOD OF FEEDING AND HANDLING THE CATTLE.

All the steers in each of the lots were numbered by means of a tag on a leather neck strap. They were weighed individually on November 24, 25, and 26, respectively, and the average of these three weights used as the initial weight. After that the steers were weighed at the end of each 28-day period. The steers of each lot were well housed at all times and did not have the run of open lots until after March 29, when they had the run of open lots both night and day. Each pen used previously to March 29 was 38 by 98 feet in size and each had troughs which were kept full of running water at all times. The steers were supplied with plenty of fresh water while in the open lots.

Mixed shavings, cornstalks, and oat straw were used for bedding in all the lots during the first half of the feeding period. After that the roads became so bad that bedding could not be hauled and the pens became somewhat sloppy. The pens had been concreted around the watering troughs during the summer and they did not become so muddy as they did the previous year.

The steers were given their feed at 7 in the morning and 3.30 in the afternoon. The cottonseed meal and corn were thoroughly mixed with the corn silage at each feeding and the feeds placed in stationary troughs. Rock salt was kept before the steers at all times.

AVERAGE DAILY RATIONS.

Table 5 shows the average daily rations by 28-day periods for each lot. As a comparison was to be made of the concentrated portion of the rations, each lot was fed as nearly the same amounts of roughage as possible. During the first 28-day period the amount of corn silage and oat straw consumed by each lot was the same. After that the steers were given what feed they would clean up within 1 hour after feeding. The silage ration was kept practically the same for all lots, so that the variations occurred chiefly in the amounts of oat straw consumed. The cattle were permitted to eat as much oat straw as they desired after being fed the silage.

TABLE 5.—*Average daily ration by 28-day periods.*

Lot No.	Number of steers.	Ration.	1st period.	2d period.	3d period.	4th period.	5th period (29 days).	Entire period (141 days).
			Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1	25	Cottonseed meal	3.1	5.0	6.6	7.0	7.0	5.7
		Corn silage	38.8	40.0	39.5	37.0	40.0	39.1
		Oat straw[1]	4.9	4.5	4.8	5.0	5.0	4.9
2	25	Cottonseed meal	1.9	2.8	3.3	3.5	3.5	3.0
		Ear corn	4.4	7.0	8.5	8.7	8.7	7.6
		Corn silage	38.8	37.4	39.4	35.1	36.0	37.4
		Oat straw[1]	4.9	3.3	2.2	2.0	2.0	2.9
3	25	Cottonseed meal	1.9	2.8	3.3	3.5	3.5	3.0
		Shelled corn	3.9	5.6	6.5	7.0	7.0	6.0
		Corn silage	38.8	40.0	39.5	35.7	38.5	38.5
		Oat straw[1]	4.9	3.5	4.0	2.6	2.4	3.5

[1] Johnson grass hay fed instead of oat straw during last 17½ days.

The steers of Lot 1 in this experiment, which received cottonseed meal as the sole concentrate, were fed as much of it as was deemed advisable for a feeding period of 141 days. Lots 2 and 3, which received broken-ear corn and shelled corn, respectively, were given an allowance of cottonseed meal which was about one-half that received by Lot 1. Lots 2 and 3 received exactly the same amounts of cottonseed meal and practically the same amount of corn without considering the cob.

The difference in the amounts of roughage consumed by each lot would be expected, since lots 2 and 3, which were getting broken-ear corn and shelled corn, were getting slightly larger amounts of roughage material in their grain allowance than Lot 1, which received cottonseed meal only.

WEIGHTS AND GAINS.

The following table shows the initial and final weights, the total and average daily gain per steer for each of the three lots:

TABLE 6.—*Weights and gains (Nov. 26, 1915, to Apr. 15, 1916—141 days).*

Lot No.	Ration.	Average initial weight per steer.	Average final weight per steer.	Average total gain per steer.	Average daily gain per steer.
		Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
1	Cottonseed meal, corn silage, and oat straw	824	1,044	220	1.56
2	Cottonseed meal, broken-ear corn, corn silage, and oat straw	824	1,059	235	1.66
3	Cottonseed meal, shelled corn, corn silage, and oat straw	826	1,066	240	1.70

The gains made by the steers, while fairly uniform, were not so good as they should have been considering the quality of the steers that were used. This may have been due somewhat to the lack of bedding during the latter part of the experiment, and to the fact that the steers were kept in pens under a barn without access to open yards during most of the experiment. As soon as the steers were transferred to open yards the daily gains increased.

QUANTITY AND COST OF FEED REQUIRED TO MAKE 100 POUNDS OF GAIN.

The following table shows the quantity and cost of feed required to make 100 pounds of gain:

TABLE 7.—*Quantity and cost of feed required to make 100 pounds of gain (Nov. 26, 1915, to Apr. 15, 1916—141 days).*

Lot No.	Ration.	Pounds of feed to make 100 pounds of gain.	Cost of 100 pounds of gain.
1	Cottonseed meal	366	
	Corn silage	2,497	$9.53
	Oat straw	310	
2	Cottonseed meal	181	
	Broken-ear corn	457	
	Corn silage	2,244	10.82
	Oat straw	173	
3	Cottonseed meal	177	
	Shelled corn	355	
	Corn silage	2,260	10.75
	Oat straw	205	

The steers of Lots 2 and 3, receiving broken-ear corn and shelled corn, respectively, made better average daily gains, but the gains made by Lot 1, which received cottonseed meal only as a concentrate, were made at much less cost per 100 pounds. While Lot 2, which received broken-ear corn, made fairly good average daily gains, the cost per 100 pounds gain in this lot was greater than that of the other two lots.

The prices used in computing the cost of the feeds were as follows:

Cottonseed meal	per ton	$27.00
Corn	per bushel	.70
Corn silage	per ton	3.00
Oat straw	do	5.00

The cottonseed meal used in the test was contracted for early and hence was obtained somewhat more cheaply than the same meal could have been purchased at a later date. It cost, however, about $5 per ton more than was paid for meal at the same station the previous year.

FINANCIAL STATEMENT.

The steers used in this experiment were delivered on the farm at a cost of 5½ cents per pound. This figure was used in making up the financial statements for each lot. The prices of feeds have already been given.

Financial statement.

Lot 1, cottonseed meal, corn silage, oat straw, and Johnson grass:	
To 25 steers, 20,593 pounds, at $5.50 per hundredweight	$1,132.63
To 20,217½ pounds cottonseed meal, at $27 per ton	272.94
To 137,773 pounds corn silage, at $3 per ton	206.66
To 14,929 pounds oat straw, at $5 per ton	37.32
To 2,187½ pounds Johnson grass, at $8 per ton	8.75
To freight charges to market	63.00
To commission, yardage, hay, etc	23.85
Total expenditure	1,745.15
By sale of 25 steers, 24,760 pounds, at $8.58 per hundredweight	2,124.80
Total net profit	379.65
Average profit per steer	15.19
Lot 2, cottonseed meal, broken-ear corn, corn silage, oat straw, and Johnson grass:	
To 25 steers, 20,167 pounds, at $5.50 per hundredweight	1,133.91
To 10,633 pounds cottonseed meal, at $27 per ton	143.55
To 26,796½ pounds (382.8 bushels) broken-ear corn, at 70 cents per bushel	267.96
To 131,672 pounds corn silage, at $3 per ton	197.51
To 9,291 pounds oat straw, at $5 per ton	23.23
To 875 pounds Johnson grass, at $8 per ton	3.50
To freight charges to market	63.00
To commission, yardage, hay, etc	23.85
Total expenditure	1,856.51
By sale of 25 steers, 25,040 pounds, at $8.60 per hundredweight	2,153.44
Total net profit	296.93
Average profit per steer	11.87
Lot 3, cottonseed meal, shelled corn, corn silage, oat straw, and Johnson grass:	
To 25 steers, 20,660 pounds, at $5.50 per hundredweight	1,136.30
To 10,633 pounds cottonseed meal, at $27 per ton	143.55
To 21,306 pounds (380.46 bushels) shelled corn, at 70 cents per bushel	266.32
To 135,796 pounds corn silage, at $3 per ton	203.69

To 11,257 pounds oat straw, at $5 per ton	$28.14
To 1,050 pounds Johnson grass, at $8 per ton	4.20
To freight charges to market	63.00
To commission, yardage, hay, etc	23.85
Total expenditure	1,869.05
By sale of 25 steers, 25,070 pounds, at $8.60 per hundredweight	2,156.02
Total net profit	286.97
Average profit per steer	11.48

It will be noted from the foregoing statement that Lot 1 made a profit per steer of $15.19; Lot 2 a profit of $11.87, and Lot 3 made a profit of $11.48 per head. It will be remembered that lot 1 made lower gains than either of the other lots; Lot 2 was second in rate of gains; while Lot 3, which made the lowest profit, had the highest average daily gains. The cost of the gains made by the different lots is responsible, more than any other factor, for these differences. The gains made by Lot 1, while smaller than the others, were made at so much less per pound that a greater profit resulted.

The two corn-fed lots brought 2 cents per 100 pounds more than Lot 1, which received cottonseed meal only. This difference in sale price was due to one steer in Lot 1, which brought only $8 per hundredweight.

The degree of finish and quality of the steers of all lots was about the same. When weighed at market there was a difference of only 30 pounds in weight between Lots 2 and 3, they weighing 25,040 and 25,070 pounds, respectively. The relation of the weights of the cattle changed very little throughout the test.

In this experiment the steers fed on cottonseed meal showed a greater profit than either the lot receiving cottonseed meal and broken-ear corn or the lot receiving cottonseed meal and shelled corn. The differences in profits were due chiefly to differences in cost of gains. With more expensive cottonseed meal or with cheaper corn the differences, of course, would have been less.

Twenty-five shotes followed the steers of Lots 2 and 3, but as an outbreak of cholera occurred on the place and the shotes got out several times, they were disposed of, and accurate records were not secured on the amount of pork produced from the refuse corn in the droppings.

Under ordinary conditions, with hogs worth 10 cents a pound, the pork credit for each steer for the 141-day period would undoubtedly have amounted to over $3 per steer. A credit of $3 per steer on Lots 2 and 3 would have made the profits on these lots about the same as for Lot 1.

Unless hogs are used to utilize the waste corn it would undoubtedly be less profitable to use corn for fattening steers than to use cottonseed meal alone at the current prices of these feeds.

SLAUGHTER DATA.

Table 8 shows the slaughter data for each of the three lots:

TABLE 8.—*Slaughter data.*

Lot No.	Ration.	Average farm weight per steer.	Average market weight per steer.	Average shrinkage in transit.		Average weight of carcass.	Per cent dressed.	
							By farm weights.	By market weights.
		Pounds.	*Pounds.*	*Pounds.*	*Per cent.*	*Pounds.*	*Per cent.*	*Per cent.*
1	Cottonseed meal, corn silage, and oat straw...	1,044	990	54	5.13	576	55.2	58.2
2	Cottonseed meal, corn silage, broken-ear corn, and oat straw.....	1,059	1,001	58	5.46	579	54.7	57.8
3	Cottonseed meal, shelled corn, corn silage, and oat straw.....	1,067	1,003	64	6.00	576	53.9	57.4

The steers were driven from the farm to West Point, Miss., a distance of 12 miles, from which point they were shipped to St. Louis. Before being loaded at West Point they were given hay and water. They had a very good run to market and made it within the 36-hour limit.

The steers of Lot 1, which were fattened on cottonseed meal, showed the least shrinkage in transit from farm to market. They shrank 54 pounds per head; the other two lots shrank 58 and 64 pounds, respectively. This was very satisfactory, being only a medium shrinkage for a 12-mile drive and a long run to market.

The carcass weights for the three lots were almost identical, and there was very little difference between the dressing percentages of the different lots. The carcasses of the steers of all lots were nice, being well covered with fat. The uniformity of the shrinkage in transit and of the dressing percentages of the steers is rather unusual and shows that there was little difference between the various lots as regards quality and finish.

SUMMARY OF THE EXPERIMENT.

1. The object of this experiment was to study the relative feeding value of (*a*) cottonseed meal alone, (*b*) a combination of one-third cottonseed meal and two-thirds broken-ear corn, and (*c*) one-third cottonseed meal and two-thirds shelled corn as the concentrates used for fattening steers for the market.

2. The steers were grades of the beef breeds of medium to good quality, raised in Mississippi, and averaging about 825 pounds at the beginning of the experiment. They were 2 and 3 year olds.

3. The steers were divided into three lots of 25 head each, and fed for 141 days. When on full feed they were fed the following rations daily:

Lot 1.

Cottonseed meal	pounds..	7
Corn silage	do....	40
Oat straw	do....	5

Lot 2.

Cottonseed meal	pounds..	3.5
Ear corn	do....	8.7
Corn silage	do....	36
Oat straw	do....	2

Lot 3.

Cottonseed meal	pounds..	3.5
Shelled corn	do....	7
Corn silage	do....	38.5
Oat straw	do....	2.4

4. The steers of Lots 1, 2, and 3 gained 1.56, 1.66, and 1.70 pounds per head per day for the entire period of 141 days. The final average weights of the three lots were 1,044, 1,059, and 1,066 pounds, respectively.

5. The cost of making 100 pounds of gain on each lot was $9.53, $10.82, and $10.75, when no pork credit is given the steers.

6. The conditions under which the cattle were kept possibly influenced the rate and consequently the cost of gains.

7. Each steer in Lots 1, 2, and 3 made a net profit of $15.19, $11.87, and $11.48, respectively, when no credit is given the steers of Lots 2 and 3 for the pork produced. The pork credit probably amounted to about $3.00 per steer.

8. When the pork made is credited to the steers of Lots 2 and 3, they paid for corn at 70 cents a bushel and then made over $14 a head profit, or almost as much as was made on the cottonseed meal-fed steers. Without hogs following the steers, the feeding of corn would have been considerably less profitable than feeding cottonseed meal alone.

9. The shrinkage in transit to market, a 34-hour run, average 54, 58, and 64 pounds per head for Lots 1, 2, and 3.

10. By market weights the steers of each lot dressed out 58.2, 57.8, and 57.4 per cent of marketable meat. The carcasses were well covered with fat and were very satisfactory.

11. The steers of all lots were well finished and very uniform. All sold for $8.60 per 100 pounds except one steer of Lot 1 which sold for $8 per hundredweight.

12. This test clearly establishes the fact that the farmer having a surplus of corn and farm roughages can market them at a handsome price through steers of good quality, when properly purchased, and at the same time retain the fertilizing elements of the feeds on the farm in the form of manure. In this work it is assumed that the cost of labor was offset by the value of the manure produced.

WASHINGTON : GOVERNMENT PRINTING OFFICE : 1919